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## ***1990s Expected to Be 'Time of Real Results'***

# **Soviets Study Mars Probe, Use of Robots**

By WILLIAM J. EATON, *Times Staff Writer*

MOSCOW—The Soviet space program, steadily expanding, has pioneered in marathon flights and virtually permanent orbiting laboratories that are prototypes for space factories of the future.

Widespread use of robots in space, to reduce the risk and strain of long journeys on humans, is being contemplated by Soviet scientists.

Preparations are beginning for an unmanned probe of Mars, and the possibility of Soviet-American cooperation on a manned flight to that planet has not been ruled out.

Roald Z. Sagdeyev, director of the Space Research Institute in Moscow, which runs the Soviet civilian space program, said: "I think the 1990s will be a time of real results." He said the program "is steadily growing" and noted that the budget for his institute has expanded fourfold in the last decade.

### **Emphasis on Secrecy**

It is impossible to get total spending figures for space research in the Soviet Union, much less information on military aspects of work in the cosmos. These are state secrets. The emphasis on secrecy is so great that the city of Leninsk, with a population of 50,000 or more, is not even listed on maps because it provides service to the nearby cosmonaut launching center at Baikonur in Kazakhstan.

Even so, Aviation Week and Space Technology magazine estimated that the Soviet Union in 1982 spent \$18 billion on its military and civilian space programs. By contrast, the U.S. Defense Department and National Aeronautics and Space Administration together reported spending \$12.7 billion in the same year.

The Soviet Union launched 98 missions with 126 spacecraft in 1982, compared to 18 missions for

the United States, the magazine said. It acknowledged that estimating Soviet outlays was an "inexact science" at best.

The U.S. Defense Intelligence Agency recently reported that "the Soviet space program is not only overwhelmingly military in nature, but the civilian and scientific aspects are entirely subordinate to the military functions."

More recently, the Pentagon's regular report, "Soviet Military Power," said the Soviet Union had an anti-satellite system that was a space weapon and also two ground-based lasers that are capable of attacking satellites in orbit.

### **'Earth Surface Surveys'**

Sagdeyev, a mild-mannered physicist, provided some rebuttal to these statements in a recent interview.

"We established a moratorium on anti-satellite testing and deployment in August, 1983, and as far as I know it is still in effect," he said. "I don't believe that any country now could have lasers that would hit satellites from the ground. This is now excluded."

He also rejected another Pentagon charge, that "earth surface surveys" made by special cameras on recent Soviet flights were made for military purposes and were not made public. He displayed a book with photos from 1982 space flights and said they were listed in a catalogue and could be obtained by other countries on application.

As for an increase in the launching of satellites for military purposes, Sagdeyev said: "I think it is agreed that this type of military reconnaissance is playing an important stabilizing role (in the verification of arms control treaties)."

Sagdeyev was more forthright about the civilian space missions, which have become more visible in

recent years. Soviet television, for example, carried live broadcasts of the launching of a spacecraft carrying an Indian cosmonaut last year. And it showed the landing of three other cosmonauts at the end of a record-long flight last fall.

That flight, lasting 8½ months, provided valuable data on the effects of weightlessness during a prolonged mission, Sagdeyev said.

"Now we perceive it's possible for a man to stay up in space for almost one year, and I think it's not the end," he said. "There are no irreversible ill effects."

But the three cosmonauts who set the record were unable to stand or walk when they returned to Earth because their bodies were not used to the pull of gravity. They had reported extreme fatigue in the final days of their marathon mission, but they appeared to have recovered at a news conference three weeks after their return.

Sagdeyev said it is "very expensive" to provide life-support systems for cosmonauts, and that studies are under way to consider methods of automating many spacecraft tasks.

### **Probe of Mars**

"Some critical operations will require human intelligence, but I'm sure most operations could be done by robots," he said.

The year 2000 is the "earliest possible" that specialized space factories could process biochemicals or pharmaceuticals on a large scale, he said. An early step, he added, may be orbiting an astronomical observatory that would be docked to a space station for use by cosmonauts.

Sagdeyev said the Soviet Union has begun a preparatory study for an unmanned probe to Mars that he envisions as an international project.

One goal, he said, is long-term

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observation of Mars' surface to detect changes since the first space probes were launched. Another objective is close observation of Phobos, one of the moons in orbit around Mars.

When asked about the Pentagon booklet's statement that the Soviet Union is considering a manned flight to Mars in 1992 on the 75th anniversary of the Bolshevik Revolution, Sagdeyev smiled and said:

"I think it is an exaggeration. Nobody is really thinking of such a mission in concrete terms. It would be a very expensive mission. I think this type of mission, if it ever should materialize, should be a major international enterprise."

He said that if the United States should want to cooperate with the Soviet Union on a mission to Mars, Moscow would be interested.

The Soviet Union began the Space Age in 1957 with the launch of Sputnik—a Russian word for traveling companion—which beamed a radio signal back to Earth.

Yuri A. Gagarin in 1961 became the first man to orbit the Earth, on a voyage lasting less than two hours. Since then, Soviet cosmonauts have logged 3,691 man-days in space, nearly triple the American total.

There have been failures as well. The first flight of a Soyuz spacecraft in April 1967, ended with the death of cosmonaut Vladimir M. Komarov, when the spacecraft's parachute snarled during re-entry and crashed in the Ural Mountains.

In September, 1983, three cosmonauts escaped uninjured when their Soyuz booster rocket exploded beneath them on the launch pad.

A breakdown in a computer guidance system led to near-disaster on a Soviet-French flight in 1982. The French participant, Jean Loup Chretien, said later in Paris that the spacecraft was tumbling "like a stone rolling over," and only quick manual operation prevented a catastrophe as the crew prepared to dock with a space station.

In all, five missions have been shortened because of difficulties with guidance systems, including one flight that lasted only 48 hours when it was unable to dock with the orbiting space laboratory.

Twice, Soviet nuclear-powered satellites have crashed to Earth. In 1978, bits of a reactor fell on Canada's Northwest Territory. In 1983, in a similar accident, parts of a Soviet satellite fell into the atmosphere over the Indian Ocean.